

MATH U142 Sec 01 - Calculus II - Fall'07 MWTh 9:15-10:20

Textbook: Greenwell, Ritchey and Lial, Calculus for the Life Sciences (2003)

Instructor: Arshag Hajian: hajian@neu.edu - Office hours: 537 Lake - MWTh 10:40-11:40 or by appointment.

Prerequisites: Math U141 or equivalent calculus preparation, including antiderivatives.

The course covers the basics of: Integral calculus and its applications. Multivariable calculus; partial derivatives, extremal values, tangent planes, multiple integrals, apps. to probability. Differential equations; Euler's method, separable equations, systems of two differential equations. Students completing the course should be able to recognize and use the concepts and methods of calculus when they occur in their disciplines.

Weekly tests (30-35 minutes) no make-ups  $\leq 60\%$  + Final exam (2 hrs)  $\geq 40\%$  of final grade.

If there is an issue discuss it with your instructor. If this does not help, please see the Undergraduate Coordinator, Professor A. Martsinkovsky (471 LA, x. 5510).

### TOPICS AND ASSIGNMENTS

#### 6. Differentiation and linear approximation

6.3 Implicit differentiation: p. 347 # 1-9 odd, 19-23, 35, 41-44.

6.4 Related rates: p. 353 # 1-3, 9-13, 23-25, 28, 32-33.

6.5 Differentials, linear approximation: p. 361 # 1-8, 11, 12, 19-26.

#### 7. Integration

7.1 Antiderivatives (review): p. 378 #1-4,5-30,45-48,51-56.

7.2 Substitution method: p.387, #2-34,36,38.

7.3. Area and the definite integral (Riemann sums) p. 397, #1,3-5,6-22,23-26,29- 36.

7.4 Fundamental Theorem of Calculus p. 409 #1-23, 31-33,41-44,46,51-52. p. 411 #53-62,64-67.

7.5. Integrals of Trig Functions : p. 418 #1-15, 25-27, 31-33,35.

7.6 Area between two curves p. 424 #1-9,22-25,27,29-30,35-36.

7 Summary p.428 #19-28,31-33,41-48,58-61,63-65,67-71,73-79 - Extended Application p. 433-435 #1-4.

#### 8. Techniques of integration, application to volume, flow and amount

8.1 Numerical integration, trapezoid, Simpson's rules p. 443 #1,5-7,13-16,17-20, p. 445 #23-35.

8.2 Integration by parts (lightly): p. 454 #1-11 odd, 21,23,35, 40-44.

8.3 Volume and average value: p. 461 #1-9,18-22,24,26-29,36,38-40.

8.4 Improper Integrals (infinite domain) p. 467 #1-8,27-30,31-33,37-38,44-47.

8 Summary p. 469 #6-9,11-15,27-29,33-40,43-44,45-49. - Extended Application p. 472-474. Ex 1-3.

#### 9. Multivariable Calculus

9.1. Functions of several variables. p. 485, #1-2,6-7,14-17,22-27,28, 32-37,39-44.

9.2 Partial Derivatives: p. 495 #3-8,18-25,35-38,39-42, 45,47-60,63-64,66.

9.3 Maxima and Minima p. 506 #1-8, 21-23. 32-33.

9.4. Total differentials and approximations. p. 512 #1-3,9-11,15-24.

9.5 Double integrals p. 524 #1-7, 13-17, 23-26,33-38, 41-44, 53-55. 64-65,68-69.

9 Summary: p. 527 #2-6,14-18,26-27,34-37,42,45-48,51-53,57-60, 63-69,73-77. Ext. App: p. 531-532.

#### 11. Differential Equations

11.1 Elementary and Separable Equations: p. 611 #1-15,19-23,27-28,33,38-42,52.

11.2 Linear first order DE: p. 621 #1-7,15-17,23-25,31,34-35,

11.3 Euler's method: p. 628 #1-5,11-14,21,25,29,30-36. 11.6 Applications of DE: p. 650 #1-16

11 Summary: p. 652 #5-12,13-20,25-27,33,38,43-46, 47-52,59-61. Ext. App.: p. 656-657, #1-6.

#### 13. Probability density functions.

13.1 Continuous Probability p. 735 #1-7,11-13,23-25,27-30,32-35,37-39.

13.2 Expected values and variance: p. 744 #1-5,9-10,11-13,15-16, 21-32.

13.2 Special density functions – exponential, normal distributions p. 756 #1- 8,11-14,27-38.

13 Summary p. 760 #2-23, 33-38,40-41. Extended Application: p. 765-767, #1-6.

Systems (optional) 10.1\*-10.4\* Intro to systems of two linear equations, matrices. (instructor to choose)

10.5\* Eigenvalues/eigenvectors of 2x2 matrices p. 593 #1-3,14,19-21.

11.4\*. Linear systems of DE p. 637 # 1-4,9,15

11.5\* Nonlinear systems of DE, phase diagrams: p. 644 #1-8,9-14.